SUBJECT NO-ME21201, SUBJECT NAME- FLUID MECHANICS

LTP- 3-1-0,CRD- 4

SYLLABUS :-

Fluid Mechanics, ME21101, 3-1-0 Introduction - continuum hypothesis, fluid properties, stress tensor. Fluid statics - pressure variation in static fluid, force on submerged surface, buoyancy, stability of submerged body. Fluid kinematics - Lagrangian and Eulerian description- velocity and acceleration, rotation and angular deformation, streamline, streakline and pathline, incompressible and irrotational flow, streamfunction and velocity potential. Inviscid Flow - Euler equation, Bernoulli equation, applications of Bernoulli equation, introduction to potential flows. Conservation laws for Control volume - Reynolds transport theorem, integral relations for conservation of mass and momentum, applications. Dimensional analysis - Buckingham Pi theorem, applications, principle of similitude. Navier-Stokes Equations- Stokes hypothesis for viscosity, non-dimensional form of NS equations –Reynolds number, exact solutions of NS equations for flow between flat plate and flow through pipe, estimation of pressure drop. External Viscous Flows- boundary layer approximation and equations, momentum integral method, approximate solution for flow over flat plates, boundary layer separation, drag and lift. Internal Viscous Flows- pipe flow, Reynolds experiment and turbulence, friction factor, Moody s diagram, pipe network, calculations for flow rate-head loss-pumping power, hydraulic diameter of ducts. Introduction to Hydraulic Machines- Euler equation for turbomachines, hydraulic turbines, centrifugal pumps, performance of turbomachines. Text Books: 1. Fluid Mechanics- Fox, McDonald, Pritchard, 8th Edition, Wiley 2. Introduction to Fluid Mechanics and Fluid Machines- Som, Biswas and Chakraborty, 3rd edition, Mcgrawhill 3. Fluid Mechanics- F M White, 8th Edition, McGrawhill 4. Fluid Mechanics- Kundu, Cohen, Dowling, 6th Edition Academic Press